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Review

The neuronal basis and ontogeny of empathy and mind reading: Review of literature and implications for future research

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Abstract

Social neuro-science has recently started to investigate the neuronal mechanisms underlying our ability to understand the mental and emotional states of others. In this review, imaging research conducted on theory of mind (ToM or mentalizing) and empathy is selectively reviewed. It is proposed that even though these abilities are often used as synonyms in the literature these capacities represent different abilities that rely on different neuronal circuitry. ToM refers to our ability to understand mental states such as intentions, goals and beliefs, and relies on structures of the temporal lobe and the pre-frontal cortex. In contrast, empathy refers to our ability to share the feelings (emotions and sensations) of others and relies on sensorimotor cortices as well as limbic and para-limbic structures. It is further argued that the concept of empathy as used in lay

terms refers to a multi-level construct extending from simple forms of emotion contagion to complex forms of cognitive perspective taking. Future research should investigate the relative contribution of empathizing and mentalizing abilities in the understanding of other people's states. Finally, it is suggested that the abilities to understand other people's thoughts and to share their affects display different ontogenetic trajectories reflecting the different developmental paths of their underlying neural structures. In particular, empathy develops much earlier than mentalizing abilities, because the former relys on limbic structures which develop early in ontogeny, whereas the latter rely on lateral temporal lobe and pre-frontal structures which are among the last to fully mature.

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Keywords

Social neuro-science; Theory of mind; Empathy; Pain; mPFC; Insula; ACC; Emotional processing

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